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FEDERAL - STATE - PRIVATE
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**SNOW SURVEY and WATER SUPPLY FORECASTS
for
MONTANA & NORTHERN WYOMING**

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE.
and
MONTANA AGRICULTURAL EXPERIMENT STATION

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Service, State Engineers of Montana and Wyoming and other
Federal, State, and private organizations.

AS OF
FEB. 1, 1960

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

TO RECIPIENTS OF COOPERATIVE SNOW SURVEY AND WATER SUPPLY FORECAST REPORTS:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Fortunately, most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from fore-knowledge of the runoff.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, about 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

By relating snow survey measurements taken over a period of years to spring-summer runoff during the same period, relationships have been developed which make it possible to forecast seasonal runoff several months in advance of occurrence. In order to make a forecast, once a forecast relationship has been developed, the maximum snow water content at previously selected key snow courses is usually entered in the forecast relationship. More accurate forecasts are often obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast relationships.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions.

PUBLISHED BY SOIL CONSERVATION SERVICE

| <u>REPORTS</u> | <u>ISSUED</u> | <u>LOCATION</u> | <u>COOPERATING WITH</u> |
|---|---------------------------------|------------------------|--|
| RIVER BASINS | | | |
| COLORADO AND STATE OF UTAH | MONTHLY (JAN.-MAY) | SALT LAKE CITY, UTAH | UTAH STATE ENGINEER AND OTHER AGENCIES |
| COLUMBIA AND STATES OF IDAHO AND ALASKA | MONTHLY (JAN.-MAY) | BOISE, IDAHO | IDAHO STATE RECLAMATION ENGINEER |
| UPPER MISSOURI AND STATE OF MONTANA | MONTHLY (FEB.-MAY) | BOZEMAN, MONTANA | MONT. AGR. EXP. STATION |
| WEST-WIDE | OCT. 1, APR. 1, MAY 1 | PORTLAND, OREGON | ALL COOPERATORS |
| STATES | | | |
| ARIZONA | SEMI-MONTHLY (JAN. 15 - APR. 1) | PHOENIX, ARIZONA | SALT R. VALLEY WATER USERS ASSOCIATION ARIZ. AGR. EXP. STATION |
| COLORADO AND NEW MEXICO | MONTHLY (FEB.-MAY) | FORT COLLINS, COLORADO | COLO. AGR. EXP. STATION COLO. STATE ENGINEER N. MEX. STATE ENGINEER |
| NEVADA | MONTHLY (FEB.-APR.) | RENO, NEVADA | NEVADA DEPT. OF CONSERVATION AND NATURAL RESOURCES - DIVISION OF WATER RESOURCES |
| OREGON | MONTHLY (JAN.-MAY) | PORTLAND, OREGON | ORE. AGR. EXP. STATION OREGON STATE ENGINEER |
| WASHINGTON | MONTHLY (FEB.-MAY) | SPOKANE, WASHINGTON | WASH. STATE DEPT. OF CONSERVATION |
| WYOMING | MONTHLY (FEB.-JUNE) | CASPER, WYOMING | WYOMING STATE ENGINEER |

Copies of these various reports may be secured from: Head, Water Supply Forecasting Section
Soil Conservation Service
209 S. W. Fifth Ave., Portland 4, Oregon

PUBLISHED BY OTHER AGENCIES

| <u>REPORT</u> | <u>ISSUED</u> | <u>AGENCY</u> |
|------------------|---------------------|---|
| BRITISH COLUMBIA | MONTHLY (FEB.-JUNE) | COMPTROLLER, WATER RIGHTS BR., DEPT. OF LANDS AND FORESTS, PARLIAMENT BLDG., VICTORIA, B.C., CANADA |
| CALIFORNIA | MONTHLY (FEB.-MAY) | CALIFORNIA DEPT. OF WATER RESOURCES, SACRAMENTO, CALIFORNIA |



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FEDERAL-STATE-PRIVATE COOPERATIVE

SNOW SURVEYS and WATER SUPPLY FORECASTS

for

MONTANA AND NORTHERN WYOMING

(Upper Missouri and Upper Columbia River Basins)

Report Prepared By:

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U. S. Department of Agriculture
Soil Conservation Service
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Montana Agricultural Experiment Station
Bozeman, Montana

Report Issued By:

H. D. Hurd
State Conservationist
of Montana

O. W. Monson
Irrigation Engineer
Montana Agricultural
Experiment Station

R. E. Huffman
Director
Montana Agricultural
Experiment Station

WATER SUPPLY OUTLOOK
as of
February 1, 1960

The February first 1960 snow-pack is much below average on many watersheds in Montana. The most acute exists in the Upper Yellowstone and Madison-Gallatin drainages. The water content of the snow in the Upper Yellowstone basin is 60 percent of last year and 55 percent of the 15-year average (1943-57 base period). Snow water content at West Yellowstone is the lowest in 22 years of record. At Lake and Canyon, in the Center of Yellowstone Park, snow is the lowest in 24 years of record. The Madison-Gallatin drainage is 72 percent of last year and 57 percent average.

The February first snow-pack over the Beaverhead-Jefferson drainage is about 10 percent less than last year and 25 percent less than the February first average.

West of the Divide, the outlook for an adequate water supply is somewhat brighter. Water content of the snow in the Upper Clark Fork basin is 95 percent of last year and 88 percent average. Snow-pack on the Flathead drainage is 80 percent of last year and 90 percent average.

Most irrigation reservoirs are above average and should provide an adequate water supply for maturing crops in localities where stream flow is anticipated to be below average. Localities having adequate reservoir storage can expect a short water supply unless precipitation during April, May and June is above average.

INDEX TO MONTANA & NORTHERN WYOMING SNOW COURSES

| Drainage Basin and Course Name | Montana Number | Location | | | | Record Began | Measuring Dates | Measured By | Drainage Basin and Course Name | Montana Number | Location | | | | Record Began | Measuring Dates | Measured By | Drainage Basin and Course Name | Montana Number | Location | | | | Record Began | Measuring Dates | Measured By | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|----------------|----------|-----------|------|-------------|--------------|-----------------|-------------|--------------------------------|----------------|----------|-----------|----------|-------------|--------------|-----------------|-----------------|--------------------------------|----------------|----------|-----------|------|-------------|--------------|-----------------|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | Elev. | Sec. Lat. | Twp. | Range Long. | | | | | | Elev. | Sec. Lat. | Twp. | Range Long. | | | | | | Elev. | Sec. Lat. | Twp. | Range Long. | | | | | | | | | | | | | | | | | | | | | | | |
| JEFFERSON RIVER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MISSOURI RIVER DRAINAGE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (ROCK-BEAVERHEAD) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (HORSE PRAIRIE) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (UPPER YELLOWSTONE) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lakeview Ridge | 11E3 | 7400 | 27 | 14S | 2W | 1948 | 3,4,5 | 10 | Camp Senia | 9D1 | 7890 | 2 | 8S | 18E | 1937 | 4 | 1 | Horse Trail Div. | 7E19 | 9200 | 29 | 55N | 90W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| Lakeview Canyon | 11E4 | 6930 | 26 | 14S | .2W | 1948 | 3,4,5 | 10 | Canyon | 10E3 | 7750 | 44°-44' | 110°-30' | 1938 | 1,2,3,4,5 | 6 | Lake Geneva | 7E16 | 9000 | 7 | 52N | 88W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | | |
| Limekiln | 11E2 | 6950 | 5 | 15S | 9W | 1948 | 3,4 | 1 | Cooke City | 10D7 | 7400 | 25 | 9S | 11E | 1937 | 1,2,3,4,5 | 6 | North Tongue | 7E15 | 8800 | 17 | 55N | 89W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| White Pine Ridge | 12E1 | 8890 | 18 | 14S | 9W | 1948 | 3,4 | 1 | Crevice Mt. | 10D5 | 8100 | 22 | 9S | 9E | 1935 | 3,4 | 2 | Sibley Lake | 7E11 | 8000 | 10 | 55N | 88W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| (SHIELDS RIVER) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bloody Dick | 13D10 | 7600 | 12 | 8S | 16W | 1948 | 3,4 | 1 | Independence | 10D6 | 8000 | 22 | 7S | 12E | 1940 | 3,4 | 1 | Sucker Creek | 7E12 | 9000 | 19 | 55N | 87W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| Gold Stone | 13D9 | 8100 | 11 | 8S | 16W | 1948 | 3,4 | 1 | Lake Camp | 10E4 | 7500 | 44°-34' | 110°-26' | 1934 | 1,2,3,4,5 | 6 | Steamboat Point | 7E10 | 7500 | 32 | 55N | 87W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | | |
| Lemhi Pass | 13E1 | 7600 | 9 | 10S | 15W | 1948 | 3,4 | 1 | Lupine Creek | 10E1 | 7300 | 32 | 56N | 106W | 1940 | 2,3,4,5 | 6 | Wood Rock G.S. | 7E13 | 8500 | 3 | 51N | 88W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| Terrell Creek | 13D12 | 6650 | 14 | 9S | 15W | 1948 | 3,4 | 1 | Lodgepole | 9E1 | 8200 | 10 | 4N | 10E | 1938 | 3,4 | 1 | (POWDER RIVER) Wyoming | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Trail Creek | 13E2 | 7090 | 15 | 10S | 15W | 1948 | 3,4 | 1 | Porcupine | 10C3 | 6500 | 10 | 4N | 10E | 1938 | 3,4 | 1 | Crazy Woman | 6E2 | 5200 | 6 | 47N | 84W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| Selway Junction | 13D11 | 6800 | 27 | 8S | 15W | 1948 | 3,4 | 1 | Shields River | 10F1 | 7500 | 10 | 7S | 16E | 1960 | 1,2,3,4,5 | 6 | Muddy Creek O.S. | 6E1 | 7000 | 2 | 46N | 84W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| (BIG HOLE) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Big Hole Pass | 13D3 | 7240 | 28 | 3S | 18W | 1948 | 3,4 | 1 | Lower Yellowstone | 9F12 | 8800 | 36 | 42N | 109W | 1955 | 2,3,4,5 | 1 | Munkers Pass | 7E8 | 9700 | 11 | 48N | 85W | 1950 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| Big Hole Pass-Be. | 13D4 | 6900 | 24 | 3S | 18W | 1948 | 3,4 | 1 | Big Warm | 9F12 | 8800 | 36 | 42N | 109W | 1955 | 2,3,4,5 | 1 | North Powder #2 | 7E36 | 8300 | 20 | 47N | 85W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| East Boundary | 13D5 | 6700 | 22 | 3S | 17W | 1948 | 3,4 | 1 | Brooks Lake #3 | 10F8 | 9200 | 23 | 43N | 110W | 1939 | 2,3,4,5 | 1 | Onion Gulch | 7E27 | 8100 | 31 | 46N | 85W | 1956 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| Gibbons Pass | 13D2 | 7100 | 4 | 2S | 19W | 1934 | 1,2,3,4,5 | 1,3 | Burroughs Creek | 9F1 | 8800 | 15 | 43N | 107W | 1948 | 2,3,4,5 | 1 | Soldier Park | 7E5 | 8700 | 36 | 51N | 85W | 1950 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| Jahnke Creek | 13D4 | 7340 | 25 | 7S | 16W | 1948 | 3,4 | 1 | Dinwoodie | 9F10 | 10000 | 21 | 39N | 105W | 1948 | 2,3,4,5 | 1 | Sour Dough | 7E6 | 8500 | 17 | 49N | 84W | 1936 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | |
| Miner Forks | 13D6 | 7300 | 24 | 6S | 17W | 1948 | 3,4 | 1 | Dry Creek | 9F9 | 9500 | 34 | LN | 6W | 1948 | 2,3,4,5 | 1 | COLUMBIA RIVER BASIN | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Miner Lake | 13D7 | 6720 | 10 | 6S | 16W | 1945 | 3,4,5 | 1 | DuNoir | 9F6 | 8750 | 27 | 42N | 108W | 1940 | 2,3,4,5 | 1 | KOOTENAI RIVER | 15B11 | 5500 | 6 | 25N | 30W | 1956 | 4,5,5 | 2 | | | | | | | | | | | | | | | | | | | | |
| (WHITE RIVER) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anderson Mdw. | 13D14 | 7000 | 18 | 3S | 12W | 1948 | 3,4 | 1 | East Fork | 15B1 | 5500 | 11 | 19N | 12W | 1951 | 2,3,4,5 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Elk Horn | 13D15 | 8150 | 15 | 4S | 12W | 1935 | 3,4,5 | 3 | Geiser Creek | 15B3 | 6750 | 6&7 | 22N | 18W | 1941 | 3,4,5 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wise River | 13D13 | 6300 | 15 | 2S | 12W | 1948 | 3,4 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



COMPARISON OF SNOW COVER WITH THAT OF PREVIOUS YEARS

Summary of Snow-Survey Data by Tributary Watersheds February 1, 1960

| TRIBUTARY BASINS | No. of Courses Averaged | No. Years Used | 1960 Snow Water Equivalent Expressed as Percent of 1959 | Average |
|------------------|-------------------------------|----------------------|---|---------|
|------------------|-------------------------------|----------------------|---|---------|

MISSOURI RIVER BASIN IN MONTANA

| | | | | |
|----------------------|----|------|----|----|
| Beaverhead-Jefferson | 11 | 5-15 | 90 | 76 |
| Madison-Gallatin | 9 | 4-15 | 72 | 57 |
| Missouri Main Stem | 4 | 15 | 91 | 91 |
| Marias-Teton | 1 | 15 | 73 | 82 |
| UPPER YELLOWSTONE | 12 | 4-15 | 60 | 55 |

COLUMBIA RIVER BASIN IN MONTANA

| | | | | |
|----------------------|----|------|----|----|
| Kootenai above Libby | 8 | 7-15 | 85 | 84 |
| Flathead | 10 | 5-15 | 80 | 90 |
| Lower Clark Fork | 5 | 6-15 | 64 | 66 |
| Upper Clark Fork | 10 | 5-15 | 95 | 88 |
| Bitterroot | 2 | 9-14 | 73 | 62 |



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AVAILABLE SOIL MOISTURE
as of
February 1, 1960

| Drainage Basin and Station | Station No. | Elev. | Soil Profile in Inches | | Date | Soil Moisture Content in Inches About Feb. 1 | | | | Y r s |
|----------------------------------|----------------|-------|---------------------------|------|------|---|------|------|------|-------------|
| | | | Depth | Cap. | | 1960 | 1959 | 1958 | Avg. | |
| <u>GALLATIN</u> | | | | | | | | | | |
| College Site | 11D2M | 4856 | 54 | 14.5 | 1/30 | 9.7 | 8.8 | 5.8 | 7.5 | 3 |
| <u>FLATHEAD</u> | | | | | | | | | | |
| Marias Pass | 13A5M | 5250 | 54 | 8.4 | 1/24 | 6.4 | 6.1 | 4.4 | 5.6 | 3 |
| Spotted Bear R.S. | 13B15M | 3700 | 28 | 5.9 | 2/2 | 5.2 | 4.9 | 3.7 | 4.5 | 3 |
| Trout Lake | 13A12M | 3600 | 54 | 11.8 | 2/1 | 12.3 | 12.4 | 11.8 | 12.0 | 3 |

AVAILABLE SOIL MOISTURE
as of
October 1, 1959

| <u>GALLATIN</u> | Station No. | Elev. | Soil Profile in Inches | | Date | 1959 | 1958 | 1957 | Avg. | Y r s |
|-------------------|----------------|-------|---------------------------|------|------|------|------|------|------|-------------|
| | | | Depth | Cap. | | | | | | |
| <u>FLATHEAD</u> | | | | | | | | | | |
| Marias Pass | 13A5M | 5250 | 54 | 8.4 | 10/1 | 5.6 | 4.5 | 3.1 | 4.4 | 4 |
| Spotted Bear R.S. | 13B15M | 3700 | 28 | 5.9 | 9/29 | 4.3 | 3.7 | 1.2 | 2.7 | 3 |
| Trout Lake | 13A12M | 3600 | 54 | 11.8 | 9/29 | 9.8 | 10.5 | 2.1 | 7.2 | 3 |

MONTANA SNOW SURVEYS ABOUT FEBRUARY 1, 1960

| No. | Snow Course Name | Elev. | MISSOURI DRAINAGE Current Information | | | Past Record | | Years Record Used In Average |
|--------------------------------------|------------------|-------|---------------------------------------|------------------|---------------------|---------------------|-----------|------------------------------|
| | | | Date of Survey | Snow Depth (In.) | Water Content (In.) | Water Content (In.) | Last Year | |
| <u>BEAVERHEAD-JEFFERSON BASIN</u> | | | | | | | | |
| 12E3 | Camp Creek | 6800 | 1/28 | 21 | 4.5 | 3.9 | 7.0 | 15 |
| 12C5 | Chessman Res. | 6200 | 2/1 | 12 | 3.0 | 2.3 | 3.4 | 15 |
| 13D2 | Gibbons Pass | 7100 | 1/27 | 45 | 9.8 | 14.2 | 16.5** | 14 |
| 11E12 | Kilgore | 6200 | 1/28 | 20 | 5.1 | 3.6 | 7.2 | 15 |
| 13D16 | Moose Creek | 6200 | 1/27 | 37 | 8.0 | 10.3 | 12.2** | 9 |
| 12C6 | Picnic Grounds | 6500 | 2/1 | 11 | 1.7 | 1.7 | 3.5** | 13 |
| 12D1 | Pipestone Pass | 7200 | 1/26 | 18 | 4.2 | 2.2 | 3.2** | 14 |
| 13C7 | Storm Lake | 7780 | 1/27 | 31 | 6.6 | 8.8 | 8.4** | 5 |
| 12C2 | Tenmile, Lower | 6250 | 1/31 | 21 | 5.1 | 4.6 | 5.1 | 15 |
| 12C3 | Tenmile, Middle | 6800 | 1/30 | 27 | 6.7 | 7.8 | 7.4 | 15 |
| 13C4 | Tenmile, Upper | 8000 | 1/30 | 31 | 8.2 | 10.6 | 9.4 | 15 |
| <u>MADISON-GALLATIN BASIN</u> | | | | | | | | |
| 11E9 | Big Springs | 6500 | 1/30 | 27 | 5.6 | 10.8 | 14.4 | 15 |
| 10D4 | Devil's Slide | 8100 | 1/31 | 45 | 13.4 | 14.6 | 11.9** | 4 |
| 11E5 | Hebgen | 6550 | 1/29 | 24 | 4.8 | 6.2 | 8.6 | 15 |
| 10D3 | Hood Meadow | 6600 | 1/30 | 20 | 4.4 | 6.6 | 4.5** | 4 |
| 11E10 | Island Park | 6315 | 1/29 | 26 | 4.8 | 6.8 | 11.3 | 15 |
| 10D1 | New World | 6700 | 1/29 | 22 | 5.5 | 6.4 | 6.8** | 10 |
| 10E2 | Norris Basin | 7500 | 2/1 | 20 | 3.8 | 5.4 | 7.7** | 8 |
| 11E6 | Twenty-One Mile | 7150 | 1/30 | 27 | 5.4 | 8.8 | 13.0 | 15 |
| 11E8 | Valley View | 6500 | 1/30 | 24 | 4.4 | 6.2 | 10.5** | 11 |
| 11E7 | West Yellowstone | 6700 | 1/29 | 18 | 3.3 | 5.0 | 8.8 | 15 |
| <u>MISSOURI MAIN STEM</u> | | | | | | | | |
| 12C5 | Chessman Res. | 6200 | 2/1 | 12 | 3.0 | 2.3 | 3.4 | 15 |
| 12C2 | Tenmile, Lower | 6250 | 1/31 | 21 | 5.1 | 4.6 | 5.1 | 15 |
| 13C3 | Tenmile, Middle | 6800 | 1/30 | 27 | 6.7 | 7.8 | 7.4 | 15 |
| 12C4 | Tenmile, Upper | 8000 | 1/30 | 31 | 8.2 | 10.6 | 9.4 | 15 |
| <u>MARIAS, TETON & SUN BASIN</u> | | | | | | | | |
| 13A5M | Marias Pass | 5250 | 2/1 | 37 | 10.7 | 14.6 | 13.0 | 15 |

** Average for years of record shown in 1943-57 base period.

MONTANA & WYOMING SNOW SURVEYS ABOUT FEBRUARY 1, 1960

| No. | Snow Course Name | Elev. | Current Information | | | Past Record | | Years Record Used In Average | |
|--|---------------------|-------|----------------------|------------------------|---------------------------|---------------------|-------------------------------|---------------------------------------|--|
| | | | Date of Survey | Snow Depth (In.) | Water Content (In.) | Water Content (In.) | 15-Year Average 1943-57 | | |
| | | | | | | Last Year | | | |
| <u>UPPER YELLOWSTONE BASIN</u> | | | | | | | | | |
| 10E3 | Canyon | 7500 | 2/1 | 23 | 3.9 | 9.8 | 10.9** | 13 | |
| 10D7 | Cooke City | 7400 | 1/30 | 14 | 2.8 | 5.0 | 6.2** | 11 | |
| 10D4 | Devil's Slide | 8100 | 1/31 | 45 | 13.4 | 14.6 | 11.9** | 4 | |
| 10E6 | East Entrance | 7000 | 1/30 | 18 | 3.5 | 7.3 | 8.8** | 9 | |
| 10D3 | Hood Meadow | 6600 | 1/30 | 20 | 4.4 | 6.6 | 4.5** | 4 | |
| 10E4 | Lake Camp | 7850 | 2/1 | 19 | 2.9 | 5.7 | 8.8** | 10 | |
| 9E1 | Lodgepole | 8200 | 2/1 | 19 | 3.3 | 6.8 | - | - | |
| 10E1 | Lupine Creek | 7200 | 2/1 | 18 | 2.8 | 6.6 | 7.9** | 12 | |
| 10D1 | New World | 6700 | 1/29 | 22 | 5.5 | 6.4 | 6.8** | 10 | |
| 10E2 | Norris Basin | 7500 | 2/1 | 20 | 3.8 | 5.4 | 7.7** | 8 | |
| 10E5 | Sylvan Pass | 7100 | 1/30 | 23 | 4.1 | 9.6 | 10.3** | 14 | |
| 10E7 | Thumb Divide | 7900 | 1/30 | 33 | 7.0 | 12.0 | 15.7** | 14 | |
| <u>LOWER YELLOWSTONE - WIND RIVER</u> | | | | | | | | | |
| 9F12 | Big Warm | 8800 | 1/26 | 18 | 2.9 | 4.7 | 5.2** | 5 | |
| 9F4 | Burrough Creek | 8800 | 1/28 | 20 | 3.8 | 10.4 | 11.0** | 11 | |
| 9F10 | Dinwoodie | 10000 | 1/29 | 28 | 7.0 | 6.3 | 8.4** | 11 | |
| 9F17 | Dinwoodie Glaciers | 10000 | 1/29 | 29 | 7.0E | 6.3 | - | 1 | |
| 9F9 | Dry Creek | 9500 | 1/29 | 14 | 2.5 | 3.9 | 4.5** | 11 | |
| 9F6 | DuNoir | 8750 | 1/26 | 13 | 2.2 | 4.3 | 6.1* | 15 | |
| 9F7 | Geyser Creek | 8500 | 1/27 | 14 | 2.0 | 4.2 | 5.3** | 11 | |
| 9F8 | Little Warm | 9500 | 1/27 | 38 | 7.9 | 10.1 | 11.8** | 10 | |
| 9F14 | Sheridan R.S. #2 | 7500 | 1/29 | 13 | 2.0 | 3.3 | 4.2** | 5 | |
| 9F3 | T-Cross Ranch | 8000 | 1/28 | 11 | 2.3 | 4.4 | 5.5 | 15 | |
| 10F9 | Togwotee Pass | 9600 | 1/29 | 54 | 14.4 | 20.9 | 20.6 | 15 | |
| 9G7 | Twenty Lakes | 10000 | 1/29 | 19 | 3.0E | 2.0 | - | 1 | |
| <u>LOWER YELLOWSTONE - POPO AGIE RIVER</u> | | | | | | | | | |
| 9G3 | Hobbs Park | 10000 | 2/2 | 38 | 7.6 | 6.9 | 12.0** | 11 | |
| 9G4 | Mosquito Park R.S. | 9500 | 2/2 | 23 | 4.1 | 2.8 | 5.5* | 16 | |
| 9F11 | St. Lawrence R.S. | 9000 | 2/1 | 17 | 2.4 | 2.0 | 4.6* | 16 | |
| 9G2 | Trout Creek | 8400 | 2/2 | 21 | 3.1 | 2.9 | 3.4** | 11 | |
| 9G7 | Twenty Lakes | 10000 | 1/29 | 19 | 3.0E | 2.0 | - | 1 | |

* Average for 15 years of data within and adjacent to the 1943-57 period.

** Average of all past data.

† Adjacent drainage.

‡ Aerial stadia marker.

WYOMING SNOW SURVEYS ABOUT FEBRUARY 1, 1960

| No. | Snow Course Name | Elev. | Current Information | | | Past Record | | | Years Record Used In Average |
|---|---------------------|---------------------|----------------------|------------------------|---------------------------|---------------------|-------------------------------|--------|---------------------------------------|
| | | | Date of Survey | Snow Depth (In.) | Water Content (In.) | Water Content (In.) | 15-Year Average 1943-57 | | |
| <u>LOWER YELLOWSTONE - GREYBULL RIVER</u> | | | | | | | | | |
| + | 9F19 | Kirwin | 10000 | 1/30 | 44 | 11.0E | - | - | - |
| <u>LOWER YELLOWSTONE - SHOSHONE RIVER</u> | | | | | | | | | |
| + | 9E4 | Carter Mountain | 7800 | 1/26 | 16 | 3.7 | 1.4 | - | - |
| + | 10E6 | East Entrance | 7000 | 1/30 | 18 | 3.5 | 7.3 | 8.7 | 15 |
| + | 9E5 | Ishawooa Cone | 9200 | 1/30 | 87 | | | | |
| + | 10E5 | Sylvan Pass | 7100 | 1/30 | 23 | 4.1 | 9.6 | 10.2** | 16 |
| + | 10F9 | Togwotee Pass | 9600 | 1/29 | 54 | 14.4 | 20.9 | 20.6 | 24 |
| + | 9F18 | Younts Peak | 8500 | 1/30 | 50 | 13.5E | | | |
| <u>LOWER YELLOWSTONE - NOWOOD CREEK</u> | | | | | | | | | |
| + | 7F1 | Bear Trap | 8000 | 1/27 | 16 | 3.8 | | | |
| + | 7F2 | Canyon Creek | 7400 | 1/28 | 24 | 5.5 | | | |
| + | 7E25 | Cold Springs Camp | 8700 | 2/1 | 16 | 3.7 | 6.5 | 5.4** | 4 |
| + | 7E24 | Medicine Lodge Lks. | 9500 | 2/1 | 27 | 6.8 | 9.2 | 8.1** | 4 |
| + | 7E8 | Munkres Pass | 9700 | 2/1 | 24 | 5.3 | 8.5 | 6.7** | 5 |
| + | 7E27 | Onion Gulch | 8100 | 1/27 | 21 | 5.0 | 7.6 | 6.8** | 4 |
| <u>LOWER YELLOWSTONE - SHELL CREEK</u> | | | | | | | | | |
| + | 7E21 | Bald Mountain | 9600 | 1/27 | 49 | 13.4 | 17.3 | 13.0** | 4 |
| + | 7E20 | Beaver-Tongue | 9200 | 1/27 | 46 | 11.7 | 17.3 | 12.4** | 4 |
| + | 7E18 | Bone-Spring | 9200 | 1/30 | 35 | 8.4E | 13.4 | 11.2** | 4 |
| + | 7E17 | Granite Pass | 8950 | 1/26 | 40 | 10.4 | 12.9 | 11.0** | 4 |
| + | 7E23 | Shell Creek | 9600 | 1/30 | 32 | 7.7E | 11.3 | 10.3** | 4 |

** Average of all past data.

+: Adjacent drainage.

+: Aerial stadia marker.

WYOMING SNOW SURVEYS ABOUT FEBRUARY 1, 1960

| No. | Snow Course Name | Elev. | Current Information | | | Past Record | | Years Record Used In Average |
|--|---------------------|------------------|----------------------|------------------------|---------------------------|---------------------|--------------|---------------------------------------|
| | | | Date of Survey | Snow Depth (In.) | Water Content (In.) | Water Content (In.) | Last Year | |
| <u>LOWER YELLOWSTONE - PORCUPINE CREEK</u> | | | | | | | | |
| 7E31 | Five Springs Falls | 7500 | 1/29 | 14 | 3.2 | 8.5 | 4.5** | 4 |
| 7E30 | Medicine Wheel | 9000 | 1/28 | 37 | 9.8 | 16.3 | 10.6** | 4 |
| <u>LOWER YELLOWSTONE - TONGUE RIVER</u> | | | | | | | | |
| ‡ | 7E20 | Beaver-Tongue | 9200 | 1/27 | 46 | 11.7 | 17.3 | 12.4** |
| ‡ | 7E32 | Big Goose #2 | 7700 | 2/1 | 21 | 4.9 | 5.9 | 5.2** |
| ‡, F | 7E18 | Bone Spring | 9200 | 1/30 | 35 | 8.4E | 13.4 | 11.2** |
| ‡ | 7E33 | Burgess R.S. #2 | 7900 | 1/29 | 22 | 5.6 | 7.0 | 5.1** |
| ‡ | 7E34 | Dome Lake #2 | 8800 | 2/2 | 21 | 4.9E | 7.5 | 5.9** |
| ‡ | 7E14 | Gloom Creek | 9300 | 2/2 | 31 | 8.0E | 10.3 | 8.1** |
| ‡ | 7E17 | Granite Pass | 8950 | 1/26 | 40 | 10.4 | 12.9 | 11.0** |
| ‡ | 7E15 | North Tongue | 8800 | 1/28 | 30 | 7.5 | 11.0 | N.R. |
| ‡ | 7E11 | Sibley Lake | 8000 | 1/29 | 27 | 6.8 | 8.6 | 6.7** |
| ‡ | 7E10 | Steamboat Point | 7500 | 1/29 | 20 | 5.4 | 6.3 | 4.5** |
| ‡ | 7E12 | Sucker Creek | 9000 | 2/2 | 26 | 6.5 | 10.2 | 7.7** |
| ‡ | 7E13 | Wood Rock G.S. | 8500 | 1/29 | 29 | 7.6 | 8.5 | 7.0** |
| <u>LOWER YELLOWSTONE - POWDER RIVER</u> | | | | | | | | |
| ‡ | 7F1 | Bear Trap | 8000 | 1/27 | 16 | 3.8 | | |
| ‡ | 7F2 | Canyon Creek | 7400 | 1/28 | 24 | 5.5 | | |
| ‡ | 7E36 | Cloud's Peak | 10000 | 2/2 | 20 | 5.0E | | |
| ‡ | 7E28 | Muddy Creek G.S. | 7500 | 1/29 | 11 | 2.0 | 3.9 | 3.1** |
| ‡ | 7E8 | Munkres Pass | 9700 | 2/1 | 24 | 5.3 | 8.5 | 6.7** |
| ‡ | 7E27 | Onion Gulch | 8100 | 1/27 | 21 | 5.0 | 7.6 | 6.8** |
| ‡ | 7E5 | Soldier Park | 8700 | 2/1 | 16 | 3.3 | 4.6 | 3.2** |
| ‡ | 7E6 | Sour Dough | 8500 | 2/2 | 14 | 2.4 | 5.5 | 5.2** |

** Average of all past data.

‡ Adjacent drainage.

‡ Aerial stadia marker.

MONTANA SNOW SURVEYS ABOUT FEBRUARY 1, 1960

| No. | Snow Course Name | Elev. | COLUMBIA DRAINAGE Current Information | | | Past Record | | Years Record Used In Average | |
|-------------------------|--------------------|-------|---------------------------------------|------------------|---------------------|---------------------|-------------------------|------------------------------|--|
| | | | Date of Survey | Snow Depth (In.) | Water Content (In.) | Water Content (In.) | 15-Year Average 1943-57 | | |
| | | | | | | Last Year | 15-Year Average 1943-57 | | |
| KOOTENAI BASIN | | | | | | | | | |
| Can. 10 | Fernie | 3500 | 1/29 | 32 | 7.0 | 5.7 | 7.4 | 15 | |
| Can. 12A | Field | 4200 | 2/1 | 24 | 7.2 | 6.5 | 4.5 | 15 | |
| Can. 43 | Gray Creek | 5100 | 1/28 | 52 | 12.3 | 11.4 | 13.0** | 9 | |
| Can. 33 | Kicking Horse | 5400 | 1/29 | 44 | 9.4 | 12.5 | 10.7** | 11 | |
| Can. 32 | Marble Canyon | 5000 | 1/29 | 46 | 6.3 | 11.9 | 11.9** | 10 | |
| Can. 10A | New Fernie | 4100 | 1/29 | 46 | 8.7 | 11.9 | 11.6** | 7 | |
| Can. 8A | Sinclair Pass | 4500 | 1/29 | 26 | 5.5 | 3.8 | 4.8** | 10 | |
| Can. 20A | Sullivan Mine | 5100 | 1/29 | 35 | 5.4 | 9.6 | 10.1** | 12 | |
| FLATHEAD BASIN | | | | | | | | | |
| 13B14A | Basin Creek | 5000 | 1/28 | 12 | 3.5 | 5.2 | 7.3** | 7 | |
| 13A2M | Desert Mountain | 5600 | 1/29 | 48 | 12.4 | 13.2 | 11.2** | 8 | |
| Can. 10 | Fernie | 3500 | 1/29 | 32 | 7.0 | 5.7 | 7.4 | 15 | |
| 13B13A | Holbrook | 4530 | 1/28 | 22 | 7.5 | 8.2 | 7.6** | 7 | |
| 13A5M | Marias Pass | 5250 | 2/1 | 37 | 10.7 | 14.6 | 13.0 | 15 | |
| Can. 10A | New Fernie | 4100 | 1/29 | 46 | 8.7 | 11.9 | 11.6** | 7 | |
| 13A13 | Quintonkon | 3800 | 2/3 | 37 | 11.0 | - | 11.0** | 5 | |
| 13B2 | Spotted Bear Mt. | 7000 | 2/2 | 39 | 11.0 | 13.6 | - | - | |
| 13A12M | Trout Lake | 3600 | 2/1 | 34 | 11.3 | 13.4 | 11.5** | 5 | |
| 14B1 | TV Mountain | 6800 | 1/27 | 34 | 8.9 | 15.2 | - | - | |
| 13B11 | Twin Creeks | 3580 | 2/1 | 27 | 8.9 | 11.6 | 8.9** | 7 | |
| CLARK FORK BASIN | | | | | | | | | |
| 12C5 | Chessman Res. | 6200 | 2/1 | 12 | 3.0 | 2.3 | 3.4 | 15 | |
| 13B10 | Coyote Hill | 4200 | 1/29 | 23 | 6.6 | 8.8 | 7.9** | 10 | |
| 15C2 | Fish Lake Airstrip | 5000 | 1/28 | 60 | 17.0 | 25.9 | 26.6** | 6 | |
| 13C4 | Intergaard | 6450 | 2/1 | 22 | 5.2 | 4.2 | 5.1** | 13 | |
| 15B2 | Lookout | 5250 | 2/1 | 57 | 16.8 | 27.2 | 25.6 | 15 | |
| 13C8 | Lubrecht For. #6 | 4040 | 2/2 | 6 | 1.7 | 3.0 | 3.4** | 6 | |
| 12D1 | Pipestone Pass | 7200 | 1/26 | 18 | 4.2 | 2.2 | 3.2** | 14 | |
| 13C5 | Southern Cross | 6500 | 2/1 | 14 | 3.2 | 2.7 | 4.1** | 13 | |
| 13C7 | Storm Lake | 7780 | 1/27 | 31 | 6.6 | 8.8 | 8.4** | 5 | |
| 13C6 | Stuart Mill | 6500 | 2/1 | 18 | 3.6 | 3.7 | 4.4 | 13 | |
| 12C2 | Tenmile, Lower | 6250 | 1/31 | 21 | 5.1 | 4.6 | 5.1 | 15 | |
| 12C3 | Tenmile, Middle | 6800 | 1/30 | 27 | 6.7 | 7.8 | 7.4 | 15 | |
| 12C4 | Tenmile, Upper | 8000 | 1/30 | 31 | 8.2 | 10.6 | 9.4 | 15 | |
| 14B1 | TV Mountain | 6800 | 1/27 | 34 | 8.9 | 15.2 | - | - | |
| BITTERROOT BASIN | | | | | | | | | |
| 13D2 | Gibbons Pass | 7100 | 1/27 | 45 | 9.8 | 14.2 | 16.5** | 14 | |
| 13D16 | Moose Creek | 6200 | 1/27 | 37 | 8.0 | 10.3 | 12.2** | 9 | |

** Average for years of record shown in 1943-57 base period.

STATUS OF RESERVOIR STORAGE

February 1, 1960

| BASIN & STREAM | RESERVOIR | USABLE CAPACITY 1000 A.F. | USABLE STORAGE - 1000 ACRE FEET | | | |
|---------------------------------------|-----------------|---------------------------------|---------------------------------|--------|--------------------|------|
| | | | 1960 | 1959 | 1943-57 Average | Yrs. |
| <u>COLUMBIA RIVER BASIN - MONTANA</u> | | | | | | |
| Flint Creek | Georgetown Lake | 31.0 | 28.6 | 28.3 | 24.0 | 15 |
| S. Fk. Flathead | Hungry Horse | 3428.0 | 3281.0 | 2956.0 | 2420.0** | 5 |
| Flathead River | Flathead Lake | 1791.0 | 1324.0 | 1194.0 | 991.3 | 15 |
| Flathead River 4/ | Camas Res. | 42.8 | 34.4 | 23.7 | 23.6 | 15 |
| Flathead River 5/ | Mission Valley | 98.6 | 50.8 | 28.7 | 31.6 | 15 |
| Clark Fork | Noxon | 200.1 | 198.0E | - | - | - |
| <u>MISSOURI RIVER BASIN - MONTANA</u> | | | | | | |
| Beaverhead | Lima | 84.0 | - | 32.2 | 32.8 | 15 |
| Madison River | Hebgen Lake | 345.0 | 36.2# | 168.2 | 223.3 | 15 |
| Madison River | Ennis Lake | 41.0 | 39.2 | 38.5 | 35.7 | 15 |
| Hyalite Creek | Middle Creek | 8.0 | 3.9 | 4.2 | 3.3** | 7 |
| Missouri River | Canyon Ferry | 2043.0 | 1773.0 | 1699.0 | 1412.0** | 5 |
| Missouri River | Hauser & | | | | | |
| | Helena Lakes | 61.9 | 43.6 | 60.1 | 48.8 | 15 |
| Missouri River | Lake Helena | 10.4 | 4.5 | 9.8 | 7.1** | 13 |
| Missouri River | Holter Lake | 81.9 | 45.2 | 59.1 | 62.1 | 15 |
| N.Fk. Sun River | Gibson | 105.0 | 67.5 | 71.2 | 59.7 | 15 |
| N.Fk. Sun River | Willow Creek | 32.3 | 14.1 | 27.9 | 18.7 | 15 |
| N.Fk. Sun River | Pishkun | 32.0 | 21.9 | 19.8 | 18.9 | 15 |
| Marias River | Tiber | 1316.0 | - | 636.6 | - | - |
| Birch Creek | Swift | 30.0 | 25.4 | - | 20.9 | 15 |
| Dupuyer & Birch | Lake Francis | 112.0 | 96.1 | - | 94.5 | 15 |
| Judith River | Ackley Lake | 5.8 | - | - | 4.2 | 15 |
| Missouri River | Ft. Peck 3/ | 19410.0 | 11020.0 | 8913.0 | 11027.0 | 15 |
| Milk River | Fresno | 127.2 | 82.5 | 29.4 | 64.0 | 15 |
| Milk River | Nelson | 66.8 | 50.2 | 42.5 | 35.6 | 15 |
| W. Rosebud Cr. | Mystic Lake | 20.8 | 9.7 | 11.4 | 11.3 | 15 |
| Tongue River | Tongue River | 68.0 | 14.0 | 15.4 | 7.5** | 14 |
| Swiftcurrent Cr. | Sherburne Lake | 66.1 | - | 34.2 | 18.1 | 15 |

** Average for years of record shown in 1943-57 period.

3/ Gross contents: Usable capacity less 617.0 A.F. Minimum power pool 4,500.0 A.F.

4/ Camas Reservoirs are shown as a sum of four (4) small reservoirs on the West side of Flathead Lake located on Dry Creek and Little Bitterroot River.

5/ Mission Valley Reservoirs are shown as a sum of eight (8) small reservoirs located South and East of Flathead Lake. Both Camas and Mission Valley Reservoirs are operated by the Indian Irrigation Service.

Hebgen Reservoir being evacuated for repairs due to earthquake.

STATUS OF RESERVOIR STORAGE

February 1, 1960

| BASIN & STREAM | RESERVOIR | USABLE CAPACITY 1000 A.F. | USABLE STORAGE - 1000 ACRE FEET | | | |
|--|----------------|---------------------------------|---------------------------------|----------|--------------------|------|
| | | | 1960 | 1959 | 1943-57 Average | Yrs. |
| <u>MISSOURI RIVER BASIN- WYOMING</u> | | | | | | |
| Shoshone River | Buffalo Bill | 440.0 | 141.4 | 0.0 | 244.6 | 15 |
| Wind River | Boysen | 560.0AC | 159.8 | 78.3 | 474.8** | 5 |
| Wind River | Pilot Butte | 31.6 | 10.5 | 6.3 | 11.2 | 15 |
| Bull Creek | Bull Lake | 152.0 | 39.5 | 56.3 | 70.7 | 15 |
| Belle Fourche | Key Hole | 190.0AC | 0.0 | 0.0 | 10.3** | 5 |
| <u>MISSOURI RIVER BASIN - NORTH DAKOTA</u> | | | | | | |
| Heart River | Lake Tschida | 68.7AC | 44.3 | 42.9 | 51.8** | 7 |
| Heart River | E.A. Patterson | 5.6AC | 3.8 | 3.7 | 3.7** | 6 |
| Missouri River | Garrison Lake | 18100.0AC | 3820.5 | 2679.4 | - | - |
| James River | Jamestown | 220.0AC | 8.2 | 12.5 | - | - |
| <u>MISSOURI RIVER BASIN - SOUTH DAKOTA</u> | | | | | | |
| Belle Fourche | Belle Fourche | 185.2AC | 27.6 | 32.0 | | |
| Cheyenne River | Angostura | 90.0AC | 17.5 | 46.4 | | |
| Cheyenne River | Deerfield | 15.1AC | 1.1 | 8.6 | | |
| Grand River | Shadehill | 84.0AC | 69.7 | 71.4 | | |
| Missouri River | Ft. Randall | 3800.0AC | 2471.5 | 1988.4 | | |
| Missouri River | Gavins Point | 320.0AC | 326.7 | 317.3 | | |
| Missouri River | Oahe | 17000.0AC | 345.0 6/ | 661.0 6/ | | |
| Cheyenne River | Pactola | 55.0AC | 23.8 | 18.4 | | |

** Average for years of record shown in 1943-57 base period.

AC Active Capacity, USBR Billings.

6/ Total Storage.

Hebgen Reservoir being evacuated for repairs due to earthquake.

Agencies Cooperating in Collecting Data Contained
in this Bulletin

U. S. Forest Service
Region I, Missoula, Montana

U. S. Geological Survey
Helena, Montana

U. S. Army Corps of Engineers
Portland, Oregon
Seattle, Washington
Omaha, Nebraska
Riverdale, N. D.

U. S. Indian Irrigation Service
St. Ignatius, Montana

U. S. Weather Bureau
Helena, Montana

U. S. Fish & Wildlife Service
Red Rock Lakes Refuge
Monida, Montana

U. S. Bureau of Reclamation
Billings, Montana
Boise, Idaho

Montana Power Company
Butte, Montana

Agricultural Experiment Station
North Montana Branch Station
Havre, Montana

Montana State Highway Dept.
East Glacier, Montana

National Park Service
Yellowstone National Park
Glacier National Park

Montana Experiment Station
Montana State College
Bozeman, Montana

Bonneville Power Administration
Portland, Oregon

Montana State School of Forestry
Montana State University
Missoula, Montana

Soil Conservation Service
Montana, Wyoming, Idaho

Soil Conservation Districts
Montana Counties

Johnson Flying Service, Inc.
Missoula, Montana

Water Rights Branch
Dept. of Lands & Forests
Victoria, British Columbia

Department of Northern Affairs
& National Resources
Calgary, Alberta

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COOPERATIVE SNOW SURVEYS**

Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

“The Conservation of Water begins with the Snow Survey”